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# THE EFFECT OF *POSTHODIPLOSTOMUM MINIMUM* UPON THE BODY WEIGHT OF THE BLUEGILL

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Posthodiplostomum minimum is one of the most frequently occurring and widespread parasites of warm-water fishes. It often produces a high level of infection in fish populations. Numerous aquatic birds, especially the great blue heron (Ardea herodias), serve as the definitive host; snails of the genus Physa serve as the first intermediate host.

The metacercaria is the infective stage for fishes. It burrows through the skin of fishes and encysts in the liver, kidney, and mesenteries. The high level of infection by the rather large metacercariae (1.2 millimeters) in some of the vital organs has led to considerable speculation as to the effects of the parasite upon fishes. Davis (1953) stated that the infection is of economic importance. Allison (1950) considered the effect of the "grubs" as being important or unimportant depending upon the environment in which the fish was found. Hunter and Hunter (1940) demonstrated that heavy experimental infections were fatal to fingerlings of the pumpkinseed (Lepomis gibbosus). Hoffman (1958), in his excellent paper on P. minimum, pointed out that even though experimental infections may be fatal, the effects of natural infections are difficult to determine. Wilson (1957) speculated that metacercariae must interfere with metabolic processes of the host fish. Huggins (1959) considered a stunted condition in a sample of black crappie (Pomoxis nigromaculatus) as being due to "white grub" infection. In contradiction to these views, Sillman (1957) reported that sunfish which

he studied showed little effect from a heavy infection. None of the preceding studies, however, were actually designed to measure quantitatively the possible effect of the infection of the metacercaria upon the fish. Inasmuch as this parasite is so widespread and occurs in important game species, it seems desirable to make a quantitative evaluation of the possible sublethal effects of the parasite. Our work is concerned with the possible effect of the parasite upon the plumpness of the bluegill (Lepomis macrochirus).

## Materials and Methods

To evaluate the effects of P. minimum on the plumpness of the bluegill, a comparison was made between the degree of infestation and condition (K). Correlation coefficients were used to determine whether a relationship existed between the two variables. The study was restricted to fish more than 4 inches in total length, and comparisons between degree of infection and K were made only between fish from a single sample. The specimens were caught by angling and electrofishing between June 26 and November 9, 1962. Each sampling consisted of 25 specimens, with the exception of a sample of 20 taken from Izaak Walton Lake. The fish constituting any one sample were all collected within a maximum period of 48 hours. The lakes sampled and their approximate areas are shown in table 1. All these lakes are frequented by the great blue heron and other birds that serve as a

TABLE 1.--Nature of correlation between coefficient of condition K of bluegill and the degree of infection of them by metacercariae of Posthodiplostomum minimum

Lake	Area of lake (acres)	Date of sampling	Range in standard length of fish (millimeters)	Range in parasite numbers <sup>1/</sup>	Mean K	Mean index of infect- ion	Coeffi- cient correla- tion
Crab Orchard							
Lake-----	6,600	June 26	89 to 132	10 to 521	3.8	24.4	-0.37
Campus Lake----	35	July 17	91 to 120	2 to 110	3.6	4.5	+0.01
Lake Murphysboro	160	Aug. 15	107 to 140	4 to 141	3.5	5.0	+0.22
Horseshoe Lake--	1,200	Aug. 25	106 to 160	61 to 1,035	4.2	26.3	+0.18
Lake Murphysboro	160	Oct. 3	113 to 144	4 to 232	3.3	7.2	+0.01
Midland Hills							
Lake-----	30	Oct. 17	102 to 146	4 to 462	3.7	8.8	+0.26
Campus Lake----	35	Nov. 1	96 to 140	23 to 186	3.5	9.9	+0.05
Izaak Walton							
Lake-----	30	Nov. 9	91 to 139	3 to 121	3.7	3.1	+0.08

<sup>1/</sup>Counts for liver and kidney combined.

primary host for P. minimum, but there is considerable variation in the intensity of use of the different lakes by these birds.

Immediately after capture, the standard length of the specimens was measured to the nearest millimeter, the gonads and stomach contents were removed, and the fish then weighed to the nearest gram. The kidney and liver were removed, put in separate 30-milliliter vials, and partly teased apart. Then an aqueous solution of 1 percent pepsin and 1 percent hydrochloric acid was added. The digesting tissue was held at 38° C. and agitated periodically. The progress of digestion was observed, and when the tissue was digested--a process requiring 15 to 25 minutes--the sample was poured into a black-bottomed pan and the encysted metacercariae were counted with the aid of a 2.5 X magnifying glass (table 1). The counts for the livers and kidneys were made separately.

As a large fish might be less affected than a small fish by a given number of parasites, the actual counts of parasites were changed to an index of infection by dividing the combined liver and kidney count by the weight of the fish in grams and multiplying by 10.

Coefficient of condition (K) was used as a measure of relative plumpness. To avoid the variables of gonadal weight and stomach contents, the K values were calculated from weights obtained after the removal of gonads and stomach contents.

Correlation coefficients between K and standard length indicated a weak positive correlation between them for the sample taken November 1 from Campus Lake (0.54) and for the sample taken from Izaak Walton Lake (0.51). Correlation coefficients between the index of infection and standard length showed no correlation.

### Results

If the metacercariae affected the plumpness of the fish, low K values should be characteristic of the more heavily infected fish, and there should be a negative correlation between index of infection and K values. For a sample of 25, a correlation coefficient value of  $\pm 0.50$  would indicate a slight correlation. None of the values obtained was at this level (table 1). It thus seems appropriate to conclude that within the limits of this study the metacercariae do not affect the plumpness of the bluegill.

### Acknowledgment

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### CONFERENCE ON VIRAL DISEASES OF POIKILOTHERMIC VERTEBRATES

Sponsored by the New York Academy of Sciences and the Eastern Fish Disease Laboratory (at Leetown, Kearneysville, West Virginia) of the Bureau of Sport Fisheries and Wildlife, a conference on viral diseases of poikilothermic vertebrates will be held in New York City at the Waldorf Astoria Hotel on September 23-26, 1964.

Dr. R. Weissenberg, who in 1914 published the first paper on lymphocystis, will be the guest of honor and deliver the keynote address.

About 45 titles of papers dealing with all phases of viral diseases, histopathology, immunity, etiology, cytology, electron microscopy, and tissue culture of fishes and amphibians have been received. More than 10 scientists from western and eastern Europe are expected to attend and present papers on carp dropsy, viral diseases of rainbow trout, and diagnostic methods.

Drs. S. F. Snieszko, Ross Nigrelli, and Ken Wolf will be co-chairmen of the conference.

More than 100 of the Atlantic salmon (Salmo salar) smolts which the National Fish Hatchery at Craig Brook, Maine, stocked during the spring of 1963 have been caught and reported by commercial fishermen in Canadian waters.